CLAIMS

What is claimed is:

1. A process for forming a thermally stable low-dielectric constant material, the process comprising:

preparing a gas mixture to form a fluorinated amorphous carbon (a-C:F) material; and

mixing said gas mixture with a boron-containing gas.

2. The process of claim 1 wherein mixing said gas mixture with said boron-containing gas includes forming a boron-doped-fluorinated-amorphous-carbon (a-C:B:F) material.

3. The process of claim 1 wherein said gas mixture comprises hydrocarbon, fluorocarbon, boron-containing gas, and an inert gas.

4. The process of claim 1 wherein said boron-containing gas comprises one of diborane (B_2H_6) and boron trifluoride (BF_3).

5. The process of claim 1 wherein said boron-containing gas is mixed to said gas mixture after said a-C:F material is formed by chemical vapor deposition (CVD) techniques.

6. The process of claim 1 wherein said boron-containing gas is mixed to said gas mixture after said a-C:F material is formed by reactive sputtering techniques.

7. The process of claim 2 wherein said a-C:B:F material is formed by chemical vapor deposition techniques.

8. The process of claim 2 wherein said a-C:B:F material is

formed by reactive sputtering techniques.

9. The process of claim 2, wherein said a-C:B:F material has an atomic composition of 45% carbon, 40% fluorine, and 15% boron.

10. A dielectric material comprising a-C:B:F material.

11. The dielectric material of claim 10, said a-C:B:F material has an atomic composition of 45% carbon, 40% fluorine, and 15% boron.

12. A process for providing an interconnect structure with low capacitance, the process comprising:

patterning at least two metal lines upon a substrate; and

forming an a-C:B:F material between said at least two metal lines.

13. The process of claim 12, wherein said a-C:B:F material is formed by the process comprising:

preparing a gas mixture to form a fluorinated amorphous carbon (a-C:F) material; and

mixing said gas mixture with a boron-containing gas.

14. The process of claim 12 wherein said a-C:B:F material is formed by chemical vapor deposition techniques.

15. The process of claim 12, wherein said a-C:B:F material has an atomic composition of 45% carbon, 40% fluorine, and 15% boron.

16. A process for providing an interconnect structure with low capacitance, the process comprising:

forming an a-C:B:F material upon a substrate;

patterning at least two trenches in said a-C:B:F material; and

forming metal into said at least two trenches.

17. The process of claim 16, wherein said a-C:B:F material is formed by the process comprising:

preparing a gas mixture to form a fluorinated amorphous carbon (a-C:F) material; and

mixing said gas mixture with a boron-containing gas.

18. The process of claim 16 wherein said a-C:B:F material is formed by chemical vapor deposition techniques.

19. The process of claim 16, wherein said a-C:B:F material has an atomic composition of 45% carbon, 40% fluorine, and 15% boron.

20. A process for providing an interconnect structure, the process comprising:

forming an a-C:B:F barrier layer on a low-k material of a substrate; and

forming a metal layer on said a-C:B:F barrier layer.

21. The process as described in claim 20 wherein said a-C:B:F barrier layer is formed, by way of chemical vapor deposition techniques.

22. A process for providing an interconnect structure with the process comprising:

forming a metal layer upon a substrate;

patterning said metal layer;

forming an a-C:B:F barrier layer onto said metal layer; and,

forming a low-k material onto said a-C:B:F barrier layer.

23. The process as described in claim 22 wherein said a-C:B:F barrier layer is deposited by way of chemical vapor deposition techniques.

24. A process for providing an interconnect structure with the process comprising:

forming a low-k material upon a substrate;

forming an a-C:B:F barrier layer onto said low-k material; and

forming a metal layer onto said a-C:B:F barrier layer.

25. The process as described in claim 24 wherein said a-C:B:F barrier layer is formed by way of chemical vapor deposition techniques.

26. A process for patterning a low-k material by a hardmask, the process comprising:

forming said low-k material upon a substrate;

forming a-C:B:F upon said low-k material;

patterning said a-C:B:F to define an a-C:B:F pattern; and,

patterning a portion of said low-k material according to said a-C:B:F pattern.

27. The process as described in claim 26 wherein said portion of said material is patterned by way of hydrogen-based reactive ion etching.

28. The process as described in claim 26 wherein said a-C:B:F is formed by way of chemical vapor deposition techniques.

29. A process for creating a pattern on an underlying material comprising:

forming said underlying material on a substrate;

depositing an anti-reflective coating (ARC), said anti-reflective coating being comprised of a-C:B:F;

forming a patterned photoresist layer on said anti-reflective coating; and,

forming a pattern in said anti-reflective coating and said underlying material according to said patterned photoresist layer.

30. The process as described in claim 29 wherein said a-C:B:F is formed by way of chemical vapor deposition techniques.